Feeding apparatus for cellulosic material

The present invention concerns a feeding apparatus for cellulosic material in which a screw feeds the material towards a counterstay for the build-up of a pressuretight material plug.

In treatment of cellulosic material, such as refining in a grinding apparatus, steam is formed, which is separated from the material, retaining its high pressure, to be utilized separately in the process. However, discharge of the material separated from the steam is done at a lower pressure, such as atmospheric pressure. In order to prevent the steam from leaving with the material and to maintain the high pressure of the steam, the material must be fed out through sluice means of any kind. Another way to seal the steam separating portion from the discharge of the material is to allow the material at the discharge to form a pulp plug, which seals the outlet so that the steam will not be entrained in the material when discharged.

In known outlet means of the latter type, the material is provided to fall down into a screw, which is, in one end, provided with drive means and in the opposite end feeds the material towards a throttling opening so that the material plug is formed. Since the driving is provided on the pressure side, the drive means must be sealed by means of pack boxes or the like, which wear out and require maintainance and possibly replacing. The plug is also formed in the end of the relatively long screw, which is opposite to the drive means, wherefore the higher load on this end of the screw makes the screw unstable. This also limits the possibilities to control the forming of the plug depending on the loading conditions.

The main object of the invention is to provide a feeding apparatus in which the drawbacks of the known apparatuses are eliminated.

This object is met by giving the apparatus the features of the following claims.

The present invention will in the following be described in more detail in connection with an example of embodiment shown in the drawings.

Figure 1 shows a side view, partly in cross section, of a feeding apparatus according to the invention.

Figure 2 shows in an enlarged scale a detail of the encircled portion of the apparatus of fig. 1.

The apparatus comprises a connection piece 10 which by a flange 12 is pressuretight connected to the outlet of a steam separator, for example of the type shown in the Swedish patent 9101342-5 (corresponding to US patent 5148998), so that the material, such as pulp, is fed to the connection piece 10 when the steam generated during the refining has been separated in the steam separator and under pressure passed to different uses in the process, such as heating of water. In order to prevent decreasing or vanishing of the pressure of the steam, the pulp must after the steam separating step be fed out in an pressuretight way. For this, the pulp falls down into a sealed house 14, provided under the connection piece 10, in which house 14 a transporter screw 16 with flights 18 provided on a shaft 20 is journalled. The shaft 20 has a conically increasing diameter towards the outlet end of the screw 16, i.e. in the direction of

the feeding of the material transported by the screw 16 to direct the material out towards the inner periphery of thehouse. At the outlet end the shaft 20 is further provided with a flange 22, which has a conically increasing diameter in said feeding direction. Around this flange 22 is a plug pipe 24 provided, which is movably journalled in the house 14 and which at one end is displaceably journalled around the outside of the house 14 by means of a spline connection 26, which is bolted to the house, so that the plug pipe may be displaced towards and away from the flange 22 for forming, together with this, an outlet gap 28 for the material. The displacement is carried out by operating rods 30 connected to the plug pipe 24 and which are operated by suitable drive motors (not shown) to displace the plug pipe in a preferred direction and in this way change the size of the gap 28.

The operating rods 30 are controlled and mounted in openings in a bearing house 42 for the shaft of the screw. In the gap 28 a controllable counter pressure against the feeding of the material occurs in this way, which makes provisions for forming a material plug 40 before the flange 22, which material plug 40 seals the interior of the house 14 from the space 34 outside of the flange 22. On the outside of the flange 22, seen in the direction of the feeding, wings 32 are provided, which are provided to cut up the annular material plug which is fed out of the gap 28 to the space 34, so that the material falls down to the bottom of the space 34. This bottom is open downwards and provided with a connection piece 36 intended for connection to any means for further transport of the material. A distance from and opposite the outlet gap 28 the space 34 is limited by a sealing wall 38, which sealingly surrounds an extension 44 of the shaft 20, which shaft extension 44 is journalled in the

bearing house 42 and is provided to be connected to a drive motor (not shown) for the screw 16. The space 34 has a connection piece 46 at the top, which is provided with an inspection cover 48.

The described apparatus works in the following way: The pulp, which comes from the steam separator (not shown) to the inlet 12, falls down into and is fed by the screw 16 towards the outlet of the house 14, i.e. in the left hand direction in fig. 1, and will be forced by the conically increasing axle 20 towards the inner periphery of the house 14 so that a pulp plug 40 will be formed before the pulp outlet, which is limited by the flange 22 provided on the axle 20. To control the discharge of the pulp plug 40 and thus retaining the pressuretight function of the plug 40, the size of the outlet opening 28 is controlled according to the invention by means of the, at the inner periphery of the house 14, journalled plug pipe 24, of which the motion is controlled by the operating rods 30. The annular pulp plug discharged through the opening 28 will, if it is not falling apart by itself, be beaten apart by wings 32 provided on the outside of the opening 28 and rotating with the shaft 20. The pulp then falls down into the lower portion of the house 34 and is fed out of the outlet 36 for further processing.

As is evident from the shown embodiment, the shaft 20 of the screw 16 is journalled with its shaft extension 44 in the bearing house 42, on the side of the house 14 of the screw 16 where there is atmosperhic pressure. In this way there is not any need for pressuretight pack boxes in the bearing house, which simplifies and reduces the costs for maintainance and operation of the apparatus. By the fact that the bearing 42 of the screw 16 is closest to the end of the screw 16 where the pulp plug 40 is

formed unstability of the screw 16 is prevented to a great extent so that better precision is achieved when setting the size of the outlet opening.